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processing system that is programmed with the instructions to perform the operations described herein. Alternatively, the operations may be performed by specific hardware components that contain hardwired logic for performing the operations, or by any combination of programmed computer components and custom hardware components. The methods described herein may be provided as a computer program product that may include a machine readable medium having stored thereon instructions that may be used to program a processing system or other electronic device to perform the methods. The term "machine readable medium" used herein shall include any medium that is capable of storing or encoding a sequence of instructions for execution by the machine and that cause the machine to perform any one of the methods described herein. The term "machine readable medium" shall accordingly include, but not be limited to, solid-state memories, optical and magnetic disks, and a carrier wave that encodes a data signal. Furthermore, it is common in the art to speak of software, in one form or another (e.g., program, procedure, process, application, module, logic, and so on) as taking an action or causing a result. Such expressions are merely a shorthand way of stating the execution of the software by a processing system cause the processor to perform an action of produce a result.

While this invention has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications of the illustrative embodiments, as well as other embodiments of the invention, which are apparent to persons skilled in the art to which the invention pertains are deemed to lie within the scope of the invention.

CLAIMS

What is claimed is:

1.   A method of stable incremental layout of a hierarchical graph comprising:

determining a level of the layout for each new node of the graph using information about hidden nodes of the graph;

determining positions of nodes on levels of the layout using information about hidden nodes of the graph; and

determining coordinates of new nodes in the layout without using information about hidden nodes.

2.   The method of claim 1, further comprising inserting new levels of the layout between existing levels when a new level is needed to contain a new node.

3.   The method of claim 2, wherein nodes on existing levels retain positions on the existing levels.

4.   The method of claim 1, wherein the determining steps are performed to minimize visual changes in the layout as compared to an initial layout of the graph.

5.   The method of claim 1, further comprising complying with quality criteria.

6.   The method of claim 1, wherein the quality criteria comprises minimization of edge crossings of the layout.

7.   The method of claim 1, wherein the quality criteria comprises minimization of back edges of the layout.

8.   An article comprising: a storage medium having a plurality of machine accessible instructions, wherein when the instructions are executed by a processor, the instructions provide for stable incremental layout of a hierarchical graph by determining a level of the layout for each new node of the graph using information about hidden nodes of the graph, determining positions of nodes on levels of the layout using information about hidden nodes of the graph, and determining coordinates of new nodes in the layout without using information about hidden nodes.

9.   The article of claim 8, further comprising instructions to insert new levels of the layout between existing levels when a new level is needed to contain a new node.

10.   The article of claim 9, wherein nodes on existing levels retain positions on the existing levels.

11.   The article of claim 8, wherein the determining instructions are executed to minimize visual changes in the layout as compared to an initial layout of the graph.

12.   The article of claim 8, further comprising complying with quality criteria.

13.   The article of claim 8, wherein the quality criteria comprises minimization of edge crossings of the layout.

14.   The article of claim 8, wherein the quality criteria comprises minimization of back edges of the layout.

15.   A method of stable incremental layout of a hierarchical graph having nodes and edges comprising:

generating an initial layout of the graph; and

generating, as a result of a change in the graph, an incremental layout of the graph based on the initial layout by performing

for each new node of the graph, determining a level of the incremental layout using information about hidden nodes of the graph, and inserting a new level in the incremental layout between existing levels when the new level is needed to contain the new node;

for each level, determining positions of new nodes on each level of the incremental layout using information about hidden nodes of the graph; and

for each level, determining coordinates of new nodes in the incremental layout without using information about hidden nodes.

16.   The method of claim 15, wherein nodes on existing levels retain positions on the existing levels.

17.   The method of claim 15, wherein the determining steps are performed to minimize visual changes in the incremental layout as compared to an initial layout of the graph.

18.   The method of claim 15, further comprising complying with quality criteria, wherein the quality criteria comprises at least one of minimization of edge crossings, and minimization of back edges.

19.   An article comprising: a storage medium having a plurality of machine accessible instructions, wherein when the instructions are executed by a processor, the instructions provide for stable incremental layout of a hierarchical graph by

generating an initial layout of the graph; and

generating, as a result of a change in the graph, an incremental layout of the graph based on the initial layout by performing

for each new node of the graph, determining a level of the incremental layout using information about hidden nodes of the graph, and inserting a new level in the incremental layout between existing levels when the new level is needed to contain the new node;

for each level, determining positions of new nodes on each level of the

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incremental layout using information about hidden nodes of the graph; and

for each level, determining coordinates of new nodes in the incremental layout without using information about hidden nodes.

20.   The article of claim 19, wherein the determining instructions are executed to minimize visual changes in the incremental layout as compared to an initial layout of the graph.

21.   The article of claim 19, further comprising complying with quality criteria, wherein the quality criteria comprises at least one of minimization of edge crossings, and minimization of back edges.